UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
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OFFICE OF
ENVIRONMENTAL CLEANUP

7 February 2013

MEMORANDUM

SUBJECT: Potlatch Free Product Recovery System
Avery Landing Site, Avery, Idaho

FROM: Earl Liverman, Federal On-Scene Coordinator
Emergency Preparedness & Prevention Unit

TO: Avery Landing Removal Action Site File

The purpose of this memorandum is to describe the discovery and removal of the Free Product Recovery System (FPRS) infiltration trench and associated structures, along with petroleum and hazardous substances contaminated soil from this area located within the Forest Highway 50 (Highway) right-of-way (ROW) by the U.S. Environmental Protection Agency (EPA) during conduct of the 2012 Avery Landing Removal Action.

1. Background

The FPRS was installed and operated by Potlatch Corporation (Potlatch) pursuant to a consent order entered into with the State of Idaho, Department of Health and Welfare, Division of Environmental Quality (IDEQ 1994). The FPRS was designed to intercept and remove free phase petroleum product referred to as light non-aqueous phase liquid (LNAPL) from groundwater. The system consisted of four subsurface extraction trenches and extraction wells, an aboveground storage tank (AST), an infiltration trench, and appurtenant flow lines (Hart Crowser 1994a). Each extraction well contained two total fluids pumps - a groundwater pump and an LNAPL pump. Although there is information which suggests that the FPRS system was to have included an oil/water separator, the FPRS as-built drawings prepared by Potlatch's contractor Hart Crowser, Inc. (Hart Crowser) show that an oil/water separator was not included as part of the constructed system. Further, an oil/water separator was not discovered when EPA partially dismantled the system as part of the removal action.

The LNAPL was collected in the AST for off-Site disposal. The groundwater, apparently absent the application of an oil/water separator or any other treatment technology, was pumped to the infiltration trench installed in the Highway north roadside ditch where it was reinjected underground (Hart Crowser 1994a). The groundwater then gradually percolated through the bottom and sides of the trench through the surrounding subsoil into the aquifer. Based on EPA's review of construction and project documents and the involvement of individuals with sufficient knowledge and experience, the infiltration trench functioned as a mechanism for discharge of groundwater and/or to encourage subsurface movement of the LNAPL toward the downgradient extraction trenches and

recovery wells. The FPRS was operated by Potlatch from approximately 1994 through 2000, and recovery of 1,290 gallons of petroleum was reported for this period (Potlatch 2001).

2. Construction of the FPRS Infiltration Trench

The FPRS was constructed for Potlatch by Hart Crowser during the Fall 1994 (Hart Crowser 1994b). The FPRS construction report states:

> *09/27/94 Activity: Excavated 230 linear feet of infiltration trench to a depth from 6.5 to 7.5 feet and placed 2 feet of crushed rock for the infiltration bed. In addition, 140 feet of carrier pipe trench was excavated to a depth of 4.5 to 5.5 feet. The carrier and infiltration piping was installed with one foot of crushed rock placed over the pipe.*
>
> *09/27/94 Comments: Infiltration trench repositioned to start 10 feet west of cast iron culvert. The carrier pipe was placed in the highway culvert and temporarily plugged.*

3. Discovery of the FPRS Infiltration Trench

The FPRS infiltration trench was discovered by EPA west of Piezometer 3 on 21 June 2012 as EPA was excavating petroleum and hazardous substances contaminated soil from the north roadside ditch of the Highway ROW. The infiltration trench was encountered in the roadside ditch approximately 7 feet below ground surface. Two 3-inch polyvinyl chloride (PVC) pipes – one solid (carrier) pipe and one perforated pipe – were in the infiltration trench and the pipes were surrounded by approximately 2 to 3 feet of crushed rock (see Photographs 1, 2, 3, and 4). The length of the infiltration trench along the Highway ROW measured approximately 230 linear feet, and the width of the infiltration trench measured approximately 6 feet.

Petroleum was visibly observed in the subsurface soil throughout the entire length and width of the infiltration trench, and a strong petroleum odor was also noted along the full length of the trench. Petroleum was also observed in soil north and south of the constructed dimensions of the infiltration trench, and petroleum-stained soil was visible 6 to 8 feet below the bottom of the crushed rock-filled infiltration trench (see Photographs 5, 6, and 7).

(b) (5)

5. Field Screening and Analytical Results

Soil samples were collected by EPA's contractor Ecology and Environment, Inc. (E&E) on 21 and 23 July 2012 at two locations in the visibly petroleum-stained infiltration trench. A petroleum odor was associated with both samples. The samples were subjected to the petroleum sheen test, and the samples exhibited a positive sheen test based on the presence of droplets of petroleum and rainbow sheen in both samples.

The soil samples were also submitted to a laboratory for analyses for contaminants of concern, including volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), Extended Diesel Range Total Petroleum Hydrocarbons (NWTPH-Dx), and polychlorinated biphenyls (PCB) analysis (E&E 2012a and E&E 2012b). The concentrations of the contaminants of concern that were detected in the samples are shown in the following table.

North Wall Infiltration Trench		
Contaminant	Sample Location	
	IE-01/IE-03 North Wall B	1E-02/IE-04 North Wall A
VOCs micrograms per kilogram (µg/kg)		
Acetone	15.7	10.7
SVOCs (µg/kg)		
Benzo(a)anthracene	402	251
Benzo(g,h,i)perylene	126JH	ND
Chrysene	629	384
Phenanthrene	2,940	1,880
Pyrene	2,660	1,110
NWTPH-DX (µg/kg)		
No. 2 Diesel (C10-C24)	1,700,000JH	590,000JH
Motor Oil (>C24-C36)	1,700,000JH	640,000JH
PCBs		
Aroclor - Total	ND	ND
Comments: ND – not detected JH – estimated with high bias		

6. Discussion of FPRS Discharge Trench Operation

Based on the performance reports prepared by Hart Crowser on FPRS operation, the system operated from late October 1994 to September 2000, with periods of non-operation due to seasonal shutdown or mechanical problems. From these reports, EPA estimates that the pumps in extraction wells EW-1 through EW-4 operated from 853 days for EW-1 to 1,668 days for EW-3. The maximum pumping rate for the type of pump used (i.e., Grundfos 40S10-3 submersible pump) is estimated to be 33 gallons per minute.

There is no groundwater sample data from the time period that the FPRS operated, thus EPA estimated an average Site concentration of 19,922 micrograms per liter (µg/L) by averaging the petroleum hydrocarbon concentrations measured in nine monitoring wells

sampled by EPA in 2007. Analytical results for total diesel- and heavy oil-range hydrocarbon concentrations in these wells ranged from 79 µg/L in well DW-01 to 155,000 µg/L in well EMW-06 (E&E 2007). If the four FPRS groundwater extraction pumps were each operated at a pumping rate of 33 gallons per minute, there was a potential capacity to discharge over 265,000,000 gallons of water, and the total mass of dissolved diesel- and heavy oil-range hydrocarbons dissolved in water would have been approximately 44,102 pounds. This estimate of dissolved-phase hydrocarbons may be on the maximum end of the range, but the FPRS operations reports do not provide groundwater extraction or reinjection volumes to allow for a more refined estimate.

In addition to this estimated quantity of dissolved-phase petroleum contamination that may have been discharged to soil and groundwater, petroleum contamination in the form of LNAPL was discharged on at least one occasion to the north Highway roadside ditch. This incident was reported by Hart Crowser in 1999, when free product was observed in the north ditch (Hart Crowser 1999). The quantity of LNAPL discharged during this incident is not reported, nor is it reported whether there were any other FPRS upsets that may have resulted in the discharge of additional LNAPL. Additionally, among the comments received from Potlatch during the EPA Engineering Evaluation/Cost Analysis public comment period, there is the following statement, which may or may not be related to the 1999 incident (Potlatch 2011):

> *There may have been one instance when reinjection of untreated ground water accidentally took place.*

7. Discussion of Submersible Pump Operation

The Grundfos 40S10-3 submersible pump is a positive air displacement pump designed for total fluid applications. The term total fluid applications means the pump is designed for recovery of fluids including water and petroleum.

Two pumps were installed in each extraction well. The lower pump was used to create a cone of depression (i.e., fluids within the influence of the pump would flow towards the pump from every direction). As a total fluid pump, there was nothing to prevent the lower pump from pumping both water and LNAPL directly to the discharge trench in the event that water levels lowered or if the pump was set too high. There were numerous mentions in the periodic Hart Crowser FPRS performance reports, that the pumps were frequently adjusted and that some of the pumps were set too high for optimal control.

8. Summary

Prior to conducting this work, the investigations and analyses of the free plume boundary conducted by various consultants for Potlatch, EPA, and the Federal Highway Administration (FHWA) did not show that the plume boundary extended north of the Highway, except possibly in the immediate proximity of the former 500,000-gallon AST.

During conduct of the Avery Landing Removal Action, EPA discovered the presence of petroleum and hazardous substances contamination associated with the FPRS infiltration trench located in the north roadside ditch of the Highway. The isolated nature of this contamination in a location where groundwater is known to have been reinjected by Potlatch as part of the FPRS suggests that the reinjected groundwater contained and so was a source of this contamination. This conclusion is further supported by information which shows there to have been a lack of any removal of contamination from the groundwater prior to reinjection in this area. The contamination of this area may also have been caused by the release of LNAPL, on one or more occasions, during operation of the FPRS. Additionally, since groundwater flow at the Avery Landing Site is generally to the south and west, it is possible that the reinjected groundwater and discharged LNAPL contributed to the groundwater-related contamination found elsewhere at FHWA property, the adjoining Bentcik property, and in the areas of the St. Joe River (E&E 2007).

REFERENCES

Ecology and Environment, Inc. (E&E). 31 July 2007. *Removal Assessment Report, Avery Landing Site, Avery, Idaho.*

_____. 31 July 2012a. Memorandum from Mark Woodke to Steve Hall discussing *Organic Data Quality Assurance Review, Avery Landing Site, Avery, Idaho*.

_____. 6 August 2012b. Memorandum from Mark Woodke to Steve Hall discussing *Organic Data Quality Assurance Review, Avery Landing Site, Avery, Idaho*.

Hart Crowser. 16 December 1994a. *Final Construction Record Drawings, Free Product Recovery System, Avery, Idaho,* prepared for Potlatch Corporation.

_____. 23 December 1994b. Memorandum from Jim Hest to Gregg Rapp discussing *Construction Report for Free Product Recovery System (FPRS), Avery Landing, Idaho*. J-2296-05.

_____. 28 April 1999. Letter from Terry Montoya and Matt Schultz to Gregory A. Rapp discussing *First Quarter 1999 Performance Report, Avery Landing Recovery System*.

Idaho Department of Health and Welfare, Division of Environmental Quality. 18 August 1994. *Consent Order between the Idaho Department of Health and Welfare, Division of Environmental Quality and Potlatch Corporation regarding the Avery Landing Site*.

Potlatch Corporation. 21 December 2001. Letter from Norm Linton to Kreg Beck discussing *Avery Landing Remediation and Project Schedule*.

Potlatch Land & Lumber, Inc. 11 March 2011. Letter from Lorrie D. Scott to Earl Liverman discussing *EPA's Draft Environmental Evaluation/Cost Analysis (EE/CA) for Avery Landing Site in Shoshone County, Idaho.*

WHW (Bill Welton) Field Notes. 30 July 2012. *Potlatch Perf Pipe (FPRS) on FHWA Property*.

PHOTOGRAPHS

1. Excavation of the FPRS infiltration trench (note the presence of the two PVC pipes – one solid [carrier] pipe and one perforated pipe – in the infiltration trench)

2. Excavation of the FPRS infiltration trench (note the outline of the infiltration trench and the presence of the PVC pipe, crushed rock, and petroleum-stained soil)

3. Excavation of the FPRS infiltration trench; 3-inch PVC carrier and infiltration pipes (facing east)

4. 3-inch PVC carrier and infiltration pipes surrounded by crushed rock and embedded in infiltration trench

5. Excavation of the FPRS infiltration trench (facing east) (note the outline of the infiltration trench and the presence of petroleum-stained soil)

6. Excavation of the FPRS infiltration trench (facing west) (note the outline of the infiltration trench and the presence of petroleum stained soil)

7. Excavation of the FPRS infiltration trench (note the outline of the infiltration trench and the presence of petroleum-stained soil)

REFERENCES